The semantics of dreams: using NLP analysis to quantify dream content and its variations across individuals

Wednesday, September 25, 2024 11:20 AM (10 minutes)

The content of dreams appears to reflect the sleeper's experiences and concerns, but also their psychophysical well-being. We implemented Natural Language Processing (NLP) tools for the quantitative and reproducible analysis of dream content to investigate dream changes as a function of age and sex in a large cohort of participants.

Two-hundred healthy Italian individuals (87M, 18-70y) wore an actigraph and recorded their last dream experience each morning upon awakening for two weeks (1,620 reports). We trained an LSTM neural network on a subset of reports scored by four raters on 15 features, including perceptual contents, affective experience, and spatial-temporal features. The algorithm was used to predict those dimensions in the whole dataset. Moreover, we identified recurrent dream topics by measuring the cumulative frequency of semantically-related words within reports. Linear mixed-effect models were used to assess the correlation between dream features and demographic variables (q <0.05, FDR correction).

We identified a negative correlation between age and the presence of social interactions and auditory experiences in dreams. Age positively correlated with visual content and spatial settings. We identified 21 recurrent topics, including work-related (20.5%) and educational (18.5%) contents, negatively-valenced affective experiences (18.5%), and animals (17.0%). References to violence and aggression increased in men and tended to decrease in women as a function of age.

NLP approaches allow for a quantitative, objective, and reproducible analysis of dream reports. We demonstrated significant dream content changes across the lifespan and as a function of sex, paving the way for further studies in clinical populations.

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